

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Hiroyasu Inoue et al.
Application No. : 10/684,981
Filed : October 14, 2003
For : OPTICAL RECORDING MEDIUM AND METHOD FOR
MANUFACTURING THE SAME

Examiner : Martin J. Angebranndt
Art Unit : 1756
Docket No. : 890050.443
Date : October 30, 2007

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Commissioner for Patents:

This brief is in furtherance of the Notice of Appeal, filed in this case on September 5, 2007. The fees required under Section 1.17(c), and any required request for extension of time for filing this brief and fees therefore, are dealt with in the accompanying transmittal letter.

I. REAL PARTY IN INTEREST

TDK Corporation is the assignee of the present application and is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 15, 17, 21, 23, 25, 27, 29, and 31-34 are pending. Claims 1-14, 16, 18-20, 22, 24, 26, 28, and 30 are canceled. Claims 15, 17, 21, 23, 25, 27, 29, and 31-34 were rejected in the Final Office Action mailed June 7, 2007. The rejection of claims 15, 17, 21, 23, 25, 27, 29, and 31-34 is appealed.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Office Action mailed June 7, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention relates to forming optical recording media. In particular, the invention relates to a dielectric layer located on the side of a light incidence plane with respect to the associated recording layer which contains an oxide selected from a group consisting of Ta₂O₅ and TiO₂ as a primary component and nitrogen as an additive. Accordingly, a proper rejection of claim 15 will require a showing of a dielectric layer with the following three features:

a) a dielectric layer is located on the side of a light incidence plane with respect to the associated recording layer,

b) a dielectric layer containing an oxide selected from a group consisting of Ta₂O₅ and TiO₂ as a *primary* component, and

c) a dielectric layer containing nitrogen as an additive.

Here, the Final Office Action fails to present any combination of art disclosing, or otherwise inherently having, the above features of the recited dielectric layer.

Figure 1 below, which is a copy of Figure 5 of the instant application with annotations added, illustrates a cross-sectional view of an optical recording embodiment with two recording layers 40, 50, and dielectric layers 42, 44, 52 and 54. The dielectric layers 44 and 54 are located on the side of a light incidence plane 33a with respect to the associated recording layer (43 a/b and 53 a/b, respectively). In particular, dielectric layers 44 and 54 contain an oxide selected from a group consisting of Ta_2O_5 and TiO_2 as a primary component and nitrogen as an additive. (Dielectric layers 42 and 52 are farthest from the light incidence with respect to the associated recording layer, and therefore, are not the recited dielectric layers.)

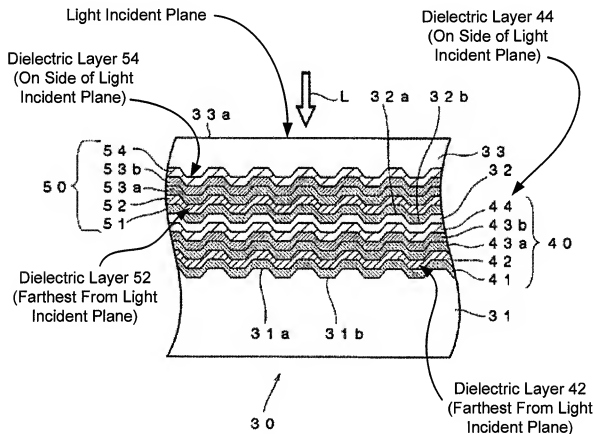


Figure 1: Copy of Fig. 5 from the Instant Application

The following shows exemplary claim 15 with reference numerals illustrated in Figures 5 and 6 noted in brackets. The identification of page and line numbers in the Specification, and identification of reference numerals used in the Figures, are exemplary only

and are not intended to limit the claims. Bolding designates portions of the Specification that may provide a relatively succinct and concise description of the identified claim features.

15. An optical recording medium comprising:

two or more recording layers spaced apart from each other [40, 50] (Specification at page 32, lines 4-26); and

dielectric layers [42, 44, 52, 54] (Specification at page 32, lines 4-26; **page 34, lines 19-27**; and page 48, lines 13-25) each formed in a vicinity of one of the recording layers [40, 50], the dielectric layer [53b] (Specification at page 32, lines 4-26) located on the side of a light incidence plane [33a] (Specification at page 32, lines 17-21) with respect to the associated recording layer [50] containing an oxide selected from a group consisting of Ta₂O₅ and TiO₂ as a primary component (Specification at page 5, lines 22-23; page 6, lines 12-15; page 7, lines 4-5; page 34, lines 19-27; **page 34, lines 19-27**; page 37, lines 17-21; page 39, lines 9-20; page 40, line 25 through page 41, line 18; and page 41, lines 24-28) and nitrogen as an additive (Specification at page 5, line 24; page 6, line 13; page 12, line 12 through page 13, line 24; page 18, line 20 through page 20, line 6; **page 23, lines 19-28**; page 34, line 22; **page 36, lines 10-25**; page 38, lines 4-12 and Table 1; page 39, lines 9-20 and Figure 7; page 40, line 25 through page 41, line 6 and Figure 9; page 41, lines 6-18 and Figure 10; page 42, lines 5-19 and Table 2; page 43, lines 4-16; page 45, lines 6-14 and Figure 13; page 45, lines 15-23 and Figure 14; page 46, lines 3-14; and **page 48, lines 13-25**).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 15, 16, and 21 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Uno et al.* (U.S. Patent 6,449,239), hereinafter *Uno '239*. Claims 15, 16, and 21-22 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Uno WO 02/2978* (which corresponds to U.S. Publication 2004/0013069), hereinafter *Uno '069*, in view of *Sakaue et al.* (U.S. Publication 2002/0168587), hereinafter *Sakaue '587*. Claims 15-18 and 21-30 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Shuy et al.* (U.S. Publication 2001/0021160), hereinafter *Shuy '160*, in view of *Sakaue '587* and *Takaoka et al.* (U.S. Patent 4,682,321), hereinafter *Takaoka '321*.

VII. ARGUMENT

A. **Claim 15 Is Not Obvious In View Of *Uno* '239**

Uno '239 fails to disclose, teach, or suggest at least the feature of a “dielectric layer *located on the side of a light incidence plane* with respect to the associated recording layer containing an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component and *nitrogen as an additive*,” as recited in claim 15 (emphasis added). More particularly, *Uno* '239 fails to disclose that its dielectric layer 3 located on the side of a light incidence plane 33a with respect to the associated recording layer contains an oxide selected from a group consisting of Ta_2O_5 and TiO_2 as a primary component, and fails to disclose that its dielectric layer contains nitrogen as an additive.

Figure 2 below, which is a copy of Figure 1 of *Uno* '239 with annotations added, illustrates a cross-sectional view of an optical recording embodiment disclosed by *Uno* '239.

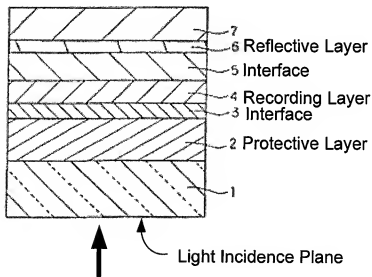


Figure 2: Copy of Fig. 1 from *Uno* '239

With respect to dielectric layers, *Uno* '239 discloses “a material of the protective layers 2 and 8, in addition to sulfide such as ZnS or the like, oxide such as SiO_2 , Ta_2O_5 , Al_2O_3 , or the like, nitride such as $Ge-N$, Si_3N_4 , Al_3N_4 , or the like, or nitrogen oxide such as $Ge-O-N$, $Si-O-N$, $Al-O-N$, or the like, **dielectric** such as carbide, fluoride, or the like, or suitable

combinations thereof have been proposed” (column 2, lines 19-26, emphasis added). Accordingly, protective layers 2 and 8 may be arguably construed as dielectric layers since they include a dielectric.

Further, based upon *Uno '239* Figure 1, protective layer 2 appears to be a dielectric layer located on the side of a light incidence plane with respect to the associated recording layer. However, *Uno '239* by itself does not disclose the recited dielectric layer of claim 15 because there is no disclosure identifying what material is a primary component of protective layer 2.

The Applicants’ specification states that when an element is a primary component, the content of the element is maximum among the elements contained therein (Specification, page 7, lines 17-23). Thus, claim 15 recites that an oxide selected from a group consisting of Ta₂O₅ or TiO₂ is a primary component (maximum) among the elements contained in the dielectric and that nitrogen is an additive (that is, therefore, less than maximum). Applicants respectfully assert that they are entitled to be their own lexicographer (*In re Castaing*, 429 F.2d 461, 166 U.S.P.Q. 550, 551 (C.C.P.A. 1970)). Accordingly, the Applicants are allowed to define terms, regardless of common or technical meaning, so long as the meaning is clear and the definition is not repugnant to the normal usage of the term. In the specification of the present invention, the term “primary component” is clearly defined in a permissible manner.

Uno '239 is completely silent as to what constitutes a primary component of a dielectric layer. In contrast, claim 15 is directed to a dielectric containing an oxide selected from a group consisting of Ta₂O₅ or TiO₂ as a primary component and nitrogen as an additive. Accordingly, *Uno '239* fails to disclose, teach or suggest this feature of the Applicants’ claimed dielectric layer.

The Final Office Action, at page 3, alleges in error that “the TiO₂ or the Ta₂O₅ would *inherently* be a primary component” (emphasis added). Applicants traverse this unsupported conclusory statement of the Final Office Action.

The Final Office Action points to *Uno '239* at column 8, lines 28-31, in attempting to establish the basis of rejection. For convenience, *Uno '239* column 8, lines 21-42 is repeated below.

As the material forming the interface layers 3 and 5, materials that can perform the above-mentioned roles may be acceptable. However, it is preferable that the material is one containing nitride, oxide nitride, oxide, carbide, or fluoride as the main component. In some cases, sulfide or selenide may be mixed. For example, Ge--N, Cr--N, Si--N, Al--N, Nb--N, Mo--N, Ti--N, Zr--N, Ta--N or the like can be used as nitride. As oxide nitride, Ge--O--N, Cr--O--N, Si--O--N, Al--O--N, Nb--O--N, Mo--O--N, Ti--O--N, Zr--O--N, Ta--O--N, or the like can be used. As oxide, SiO₂, Al₂O₃, TiO₂, Ta₂O₅, Zr--O, or the like can be used, and Ge--C, Cr--C, Si--C, Al--C, Ti--C, Zr--C, Ta--C, or the like can be used as carbide. Further, Li--F, Ca--F, or the like can be used as fluoride. Alternatively, a suitable mixture thereof may be used. When a suitable amount of sulfide or selenide is mixed, ZnS, ZnSe, or the like can be used. In any cases, the material used for the interface layers 3 and 5 may be one that does not disperse easily into the recording layer 4 or that does not easily hinder the optical change of the recording layer 4 even when dispersing into the recording layer 4 and that facilitates the crystallization of the recording layer 4 when being provided while being in contact with the recording layer 4.

Interface layers 3 and 5 are not disclosed as having a dielectric. Therefore, interface layers 3 and 5 are not dielectric layers (as contrasted with the *Uno* '239 protective layers 2 and 8 which do include a dielectric). Accordingly, it is not proper for the Final Office Action to use the *Uno* '239 disclosure describing the interface layers 3 and 5 (which completely fail to have any type of dielectric) to establish the basis of rejection for the recited dielectric layer of claim 15 because the inference is not supported by actual disclosure in *Uno* '239. Since the allegation is not supported in *Uno* '239, a *prima facie* case establishing an obviousness rejection by *Uno* '239 has not been made. Thus, claim 15 is not obvious under *Uno* '239 and the rejection should be withdrawn.

Furthermore, those portions of *Uno* '239 pertaining to the protective layers 2 and 8 (which are the only layers disclosed as having a dielectric) do not support an allegation that an oxide selected from a group consisting of TiO₂ or the Ta₂O₅ would *inherently* be a primary component of the dielectric layer. That is, *Uno* '239 does not disclose that TiO₂ or the Ta₂O₅ are the primary components of protective layers 2 and 8.

Furthermore, those portions of *Uno* '239 pertaining to the protective layers 2 and 8 (which are the only layers disclosed as having a dielectric) do not support an allegation that nitrogen is an additive of the dielectric layer. That is, *Uno* '239 does not disclose that nitrogen is an additive of protective layers 2 and 8.

Accordingly, the rejection relies on an inference that is not supported by actual disclosure in *Uno '239*. Since the allegation is not supported in *Uno '239*, a *prima facie* case establishing an obviousness rejection by *Uno '239* has not been made. Thus, claim 15 is not obvious under *Uno '239* and the rejection should be withdrawn.

B. Claim 15 Is Not Obvious In View Of *Uno '069* Modified By *Sakaue '587*

The proposed combination of *Uno '069* (and therefore *Uno WO 02/2978*) in view of *Sakaue '587* does not disclose, teach, or suggest at least the feature of a “dielectric layer located on the side of a light incidence plane with respect to the associated recording layer containing an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component and nitrogen as an additive,” as recited in claim 15 (emphasis added).

Figure 3 below, which is a copy of *Uno '069* Figure 1, illustrates a cross-sectional view of the *Uno '069* optical recording medium.

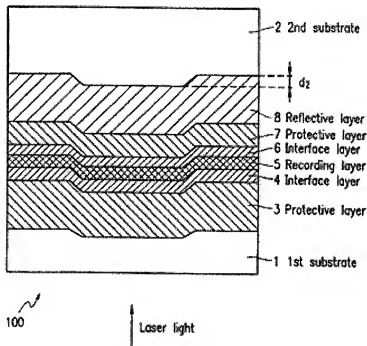


Figure 3: Copy of Fig. 1 from *Uno '069*

Uno '069 discloses that “interface layers 4 and 6 may be formed of a material providing the above-described functions. Specifically, usable exemplary materials include, as a

main component, nitrides such as Ge--N, Ge--Si--N, Ge--Cr--N, Ge--Mn--N, Cr--N, Si--N, Al--N, Nb--N, Mo--N, Ti--N, Zr--N, Ta--N and the like; nitrides-oxides such as Ge--O--N, Cr--O--N, Si--O--N, Al--O--N, Nb--O--N, Mo--O--N, Ti--O--N, Zr--O--N, Ta--O--N and the like; oxides such as Si--O, Al--O, Ti--O, Ta--O, Zr--O, and the like; carbides such as Ge--C, Cr--C, Si--C, Al--C, Ti--C, Zr--C, Ta--C and the like; fluorides such as Si--F, Al--F, Ca--F and the like; derivatives thereof; and any combination thereof. Especially, use of a nitride or a nitride-oxide as a main component is preferable since such a material generally realizes formation of a fine, dense layer, and thus noticeably provides the above-described effects" (paragraph 0049, emphasis added).

However, *Uno '069* is not disclosing that the interface layers 4 and 6 are dielectric layers. In fact, *Uno '069* fails to disclose a dielectric in the interface layers 4 and 6. That is, *Uno '069* is entirely silent about dielectric materials and/or layers. Accordingly, *Uno '069* cannot disclose anything about the recited dielectric layer of claim 15 (a dielectric layer containing an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component). Furthermore, *Uno '069* also fails to disclose *nitrogen as an additive* in a dielectric layer (since *Uno '069* is entirely silent about dielectric materials and/or layers). Thus, *Uno '069* requires another reference in combination to establish a proper basis of rejection.

Sakaue '587 also fails to disclose, teach or suggest a *dielectric layer located on the side of a light incidence plane* with respect to the associated recording layer containing an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component and *nitrogen as an additive* for at least the following reasons.

Figure 4 below, which is a copy of *Sakaue '587* Figures 1 and 2 (with annotations added), illustrates a cross-sectional view of the *Sakaue '587* optical recording medium.

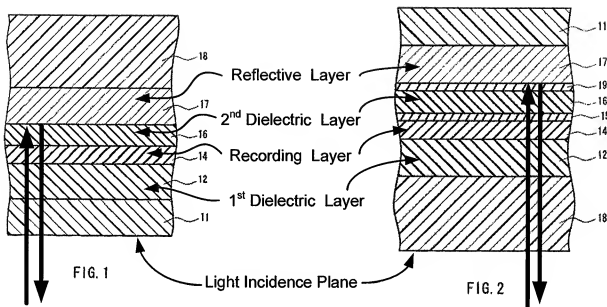


Figure 4: Copy of Figs. 1 and 2 from *Sakaue '587*

It is apparent that the *Sakaue '587* first dielectric layer 12 is the dielectric layer closest to the light incidence (in view of the position of the reflective layer 17, which reflects laser light). However, the *Sakaue '587* first dielectric layer 12 *is not* a dielectric layer containing an oxide selected from a group consisting of Ta_2O_5 and TiO_2 as a primary component and nitrogen as an additive.

Sakaue '587 discloses conditions when forming the second dielectric layer 16 in paragraph [0061], repeated below (emphasis added).

For reference, a ZnS--SiO_2 film of 50 nm thickness was formed as the second dielectric layer. The film forming conditions when using an oxide or nitrooxide of Ta for the second dielectric layer as in the present invention were as follows: Using a sputtering target of Ta_2O_5 and a mixed gas of Ar and O_2 (with 10% O_2 concentration) as the film forming gas, a 50 nm Ta oxide film was formed. Alternatively, using a mixed gas of Ar and N_2 (with 10% N_2 concentration) as the film forming gas, a 50 nm Ta nitrooxide film was formed.

Sakaue '587 paragraph [0061] is not disclosing anything with respect to conditions for forming the first dielectric layer 12 (the dielectric layer located on the side of a light incidence plane with respect to the associated recording layer). The disclosed *Sakaue '587*

second dielectric layer 16 is formed on the side farthest from a light incidence plane, as clearly illustrated in *Sakaue* '587 Figures 1 and 2. Accordingly, it is not proper to infer that conditions pertaining to forming the second dielectric layer 16 equally pertain to conditions for forming the first dielectric layer 12.

Furthermore, the disclosed conditions when forming the second dielectric layer 16 do not disclose that an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component is used. Accordingly, it is not proper to infer from the *Sakaue* '587 disclosure (limited to describing conditions for forming the *Sakaue* '587 second dielectric layer) that the first dielectric layer 12 contains an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component.

Finally, *Sakaue* '587 discloses nitrogen gas used in forming the second dielectric layer 16. Nitrogen is not disclosed as an additive in the first dielectric layer 12. Thus, *Sakaue* '587 fails to disclose, teach, or suggest a dielectric layer located on the side of a light incidence plane with respect to the associated recording layer with nitrogen as an additive.

Accordingly, *Sakaue* '587 fails to disclose the recited features of the dielectric layer of claim 15 (which is located on the side of a light incidence plane with respect to the associated recording layer). Thus, even if the *Sakaue* '587 second dielectric layer 16 is used to modify *Uno* '069 (which apparently has no dielectric layers), the recited features of claim 15 are still not disclosed by the proposed combination of *Uno* '069 in view of *Sakaue* '587. Therefore, a *prima facie* case establishing an obviousness rejection by *Uno* '069 in view of *Sakaue* '587 has not been made. Thus, claim 15 is not obvious under the proposed combination of *Uno* '069 (and therefore *Uno* WO 02/2978) in view of *Sakaue* '587 and the rejection should be withdrawn.

C. Claim 15 Is Not Obvious In View Of *Shuy* '160 Modified By *Sakaue* '587 and *Takaoka* '321

Shuy '160 fails to disclose, teach or suggest a dielectric layer (located on the side of a light incidence plane with respect to the associated recording layer) consisting of an oxide selected from a group consisting of Ta_2O_5 or TiO_2 as a primary component, as recited in claim 15. *Shuy* '160 also fails to disclose, teach or suggest a dielectric layer (located on the side of a light incidence plane with respect to the associated recording layer) with nitrogen as an additive

in a dielectric layer, as recited in claim 15. *Takaoka* '321 also fails to disclose, teach or suggest at least the above-recited features of claim 15. The obviousness rejection under 35 U.S.C. § 103(a) uses *Sakaue* '587 as a secondary reference to cure this above described deficiency in the disclosures of *Shuy* '160 and *Takaoka* '321. That is, the Final Office Action relies on *Sakaue* '587 to disclose a dielectric layer located on the side of a light incidence plane with respect to the associated recording layer containing an oxide selected from a group consisting of Ta₂O₅ and TiO₂ as a primary component with nitrogen as an additive.

As noted above, *Sakaue* '587 fails to disclose, teach or suggest a dielectric on the side of the light incidence containing an oxide selected from a group consisting of Ta₂O₅ or TiO₂ as a *primary* component. Further, *Sakaue* '587 fails to disclose, teach or suggest a dielectric on the side of the light incidence with nitrogen as an additive. What *Sakaue* '587 discloses with respect to a dielectric layer farthest from the light incidence can not be properly used to modify a dielectric layer closest to the light incidence.

Accordingly, the proposed combination of *Shuy* '160 in view of *Sakaue* '587 and *Takaoka* '321 does not disclose at least the claimed limitations of a “dielectric layer located on the side of a light incidence with respect to the associated recording layer containing an oxide selected from a group consisting of Ta₂O₅ or TiO₂ as a primary component and nitrogen as an additive,” as recited in claim 15. Therefore, a *prima facie* case establishing an obviousness rejection by *Shuy* '160 in view of *Sakaue* '587 and *Takaoka* '321 has not been made. Thus, claim 15 is not obvious under the proposed combination of *Shuy* '160 in view of *Sakaue* '587 and *Takaoka* '321 and the rejection should be withdrawn.

D. Dependent Claims

Because independent claim 15 is allowable over the cited art of record, dependent claims 17, 21, 23, 25, 27, 29, and 31-34 (which depend from independent claim 15) are allowable as a matter of law for at least the reason that the dependent claims 17, 21, 23, 25, 27, 29, and 31-34

contain all features/elements of independent claim 15. See, e.g., *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). Accordingly, the rejection to these claims should be withdrawn.

Respectfully submitted,
Seed Intellectual Property Law Group PLLC



Raymond W. Armentrout
Registration No. 45,866

RWA:cl

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

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VIII. CLAIMS APPENDIX

1-14. (Canceled)

15. An optical recording medium comprising:

two or more recording layers spaced apart from each other; and

dielectric layers each formed in a vicinity of one of the recording layers, the dielectric layer located on the side of a light incidence plane with respect to the associated recording layer containing an oxide selected from a group consisting of Ta₂O₅ and TiO₂ as a primary component and nitrogen as an additive.

16. (Canceled)

17. An optical recording medium in accordance with Claim 15, wherein each of the recording layers includes a first recording film containing an element selected from a group consisting of Si, Ge, Sn, Mg, C, Al, Zn, In, Cu, Ti and Bi as a primary component and a second recording film containing an element selected from a group consisting of Cu, Al, Zn and Ag and different from the element contained as a primary component in the first recording film as a primary component.

18.-20.(Canceled)

21. An optical recording medium in accordance with Claim 15, wherein the two or more recording layers are constituted so that data can be recorded therein by a laser beam having a wavelength of 380 nm to 450 nm.

22. (Canceled)

23. An optical recording medium in accordance with Claim 17, wherein the second recording film is formed so as to be in contact with the first recording film.

24. (Canceled)

25. An optical recording medium in accordance with Claim 17, wherein the first recording film contains an element selected from a group consisting of Si, Ge and Sn as a primary component.

26. (Canceled)

27. An optical recording medium in accordance with Claim 17, wherein the second recording film contains Cu as a primary component.

28. (Canceled)

29. An optical recording medium in accordance with Claim 17, wherein the second recording film is added with an element selected from the group consisting of Cu, Al, Zn, Ag, Mg, Sn, Au, Ti and Pd and different from the element contained in the first recording film as a primary component.

30. (Canceled)

31. An optical recording medium in accordance with Claim 21, wherein the dielectric layer contains Ta_2O_5 as the primary component and wherein the dielectric layer contains one to twelve atomic % of nitrogen as an additive.

32. An optical recording medium in accordance with Claim 31, wherein the dielectric layer contains two to ten atomic % of the nitrogen as the additive.

33. An optical recording medium in accordance with Claim 21, wherein the dielectric layer contains Ta_2O_5 as the primary component and wherein the dielectric layer contains one to five atomic % of nitrogen as an additive.

34. An optical recording medium in accordance with Claim 33, wherein the dielectric layer contains two to four atomic % of the nitrogen as the additive.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.